Safety module **CS AM-01**

Safety modules for motor standstill monitoring

Main features

- For safety applications up to SIL CL 2/PL d
- Select from 10 different residual voltages on motor standstill.
- Galvanic separation between control circuit and measurement circuit.
- 45 mm housing
- 2 NO safety contacts
  1 NC auxiliary contact
- 2 semiconductor outputs:
  - - 1 signalling output for failure state
  - - 1 signalling output for switching state of safety relays
- Possibility to connect single-phase or three-phase motors to measuring circuits.
- Supply voltages: 24 … 230 Vac/dc

Utilization categories

Alternating current: AC15 (50…60 Hz)
Ue (V) 230
Ie (A) 3
Direct current: DC13 (6 oper. cycles/min.)
Ue (V) 24
Ie (A) 4

Quality marks:

EC type examination certificate: IMQ CS 487 DM
UL approval: E131787
CCC approval: 2020970305002290
EAC approval: RU C-IT.УТ03.B.00035/19

Compliance with the requirements of:

Machinery Directive 2006/42/EC,
EMC Directive 2014/30/EC,
RoHS Directive 2011/65/EU.

Technical data

Housing

Polyamide housing PA 66, self-extinguishing V0 acc. to UL 94

Protection degree acc. to EN 60529:	IP40 (housing), IP20 (terminal strip)
Dimensions:	see page 355, design C

General data

SIL level (SIL CL) up to:	SIL CL 2 acc. to EN 62061
Performance Level (PL) up to:	PL d acc. to EN ISO 13849-1
Safety category up to:	cat. 3 acc. to EN ISO 13849-1
Safety parameters:	see page 417
Ambient temperature:	-25°C…+55°C
Mechanical endurance:	>10 million operating cycles
Electrical endurance:	>100,000 operating cycles
Pollution degree:	external 3, internal 2
Rated impulse withstand voltage (U_{imp}):	4 kV
Rated insulation voltage (U_i):	250 V
Overvoltage category:	II

Supply

Rated supply voltage (U_n):	24 … 230 Vac/dc; 50…60 Hz
Max. DC residual ripple in DC:	10%
Supply voltage tolerance:	±15% of U_n
Power consumption AC:	< 6 VA
Power consumption DC:	< 2 W

Input circuit

Voltage between terminals L1-L2-L3:	0 … 690 V
Frequency:	0 … 3 kHz
Input impedance:	>1 MΩ
Started motor threshold voltage:	from 20 mV to 500 mV adjustable in 10 increments
Stopped motor threshold voltage:	half the motor threshold voltage with motor in operation
Maximum input impedance Y1-Y2:	< 20 Ω
Current in START Y1-Y2 circuit:	70 mA (typical)
RESET input voltage:	24 Vdc ± 20%
RESET input current:	10 mA (typical)

Control circuit

Response time t_A:	< 3 s
Release time t_{R1}:	< 200 ms
Release time in absence of power supply t_R:	< 3 s
Simultaneity time t_{C1}, t_{C2}:	3 s
Test:	Self-test upon activation of the supply voltage and after activation of the RESET input.
Test duration:	2.5 s(During the test, the voltage in the measurement circuits must be less than the threshold voltage of the motor while at a standstill)

In compliance with standards:

EN 60204-1, EN ISO 14118, EN ISO 12100, EN 60529, EN 61000-6-2, EN 61000-6-3, EN 61326-1, EN 60664-1, EN 60947-1, EN IEC 63000, EN ISO 13849-1, EN ISO 13849-2, EN 62061, UL 508, CSA C22.2 n° 14-95, GB/T14048.5

Output circuit

Output contacts:	2 NO safety contacts, 1 NC auxiliary contact
Contact type:	forcibly guided
Material of the contacts:	gold-plated silver alloy
Maximum switching voltage:	230/240 Vac; 300 Vdc
Max. current per contact:	6 A
Conventional free air thermal current I_{th}:	6 A
Max. total current Σ I_{th}^2:	36 A²
Minimum current:	10 mA
Contact resistance:	≤ 100 mΩ
External protection fuse:	4 A
Semiconductor outputs:	PNP outputs galvanically separated, overvoltage and short-circuit protected
Switching voltage:	24 Vdc
Switching current:	50 mA
External supply voltage:	24 Vdc ±20%

The number and the load capacity of output contacts can be increased by using expansion modules or contactors. See pages 295-304.

Code structure

article: **CS AM-01VE01** options: **-TC00UR1**

Threshold voltage for motor at standstill	
	20-500 mV (standard)
UR1	45-750 mV

Connection type	
V	Screw terminals
M	Connector with screw terminals
X	Connector with spring terminals

Simultaneity time (t_c)	
	3s (standard)
TC00	infinite at standstill (t_c)
TA00	infinite on startup and standstill(t_c)
TD0	infinite on standstill and minimum activation time (t_A)

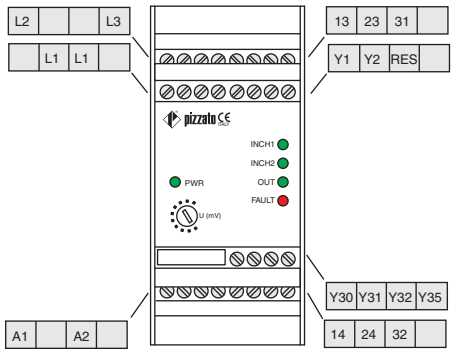
Features approved by UL

Rated supply voltage (U_n):	24 ... 230 Vac/dc; 50 … 60 Hz
Power consumption AC:	< 9 VA
Power consumption DC:	< 2 W
Relay output:	
Electrical ratings:	230/240 Vac 6 A general use C300 pilot duty
Semiconductor output:	24 Vdc, 50 mA
Motor input:	up to 600 V

Notes:
- For use in pollution degree 2 environment
- Use 60 or 75°C copper (Cu) conductor and wire size No. 30-12 AWG, stranded or solid.
- The terminal tightening torque of 5-7 lb in.

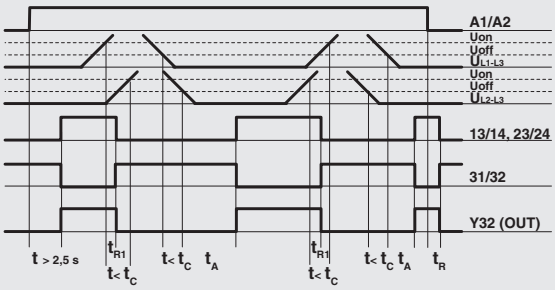
Safety module CS AM-0

Pin assignment

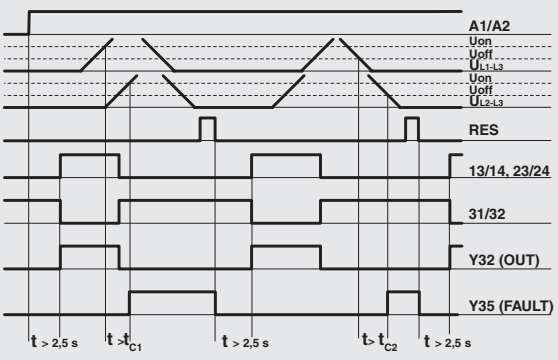


Function diagrams

Normal operation

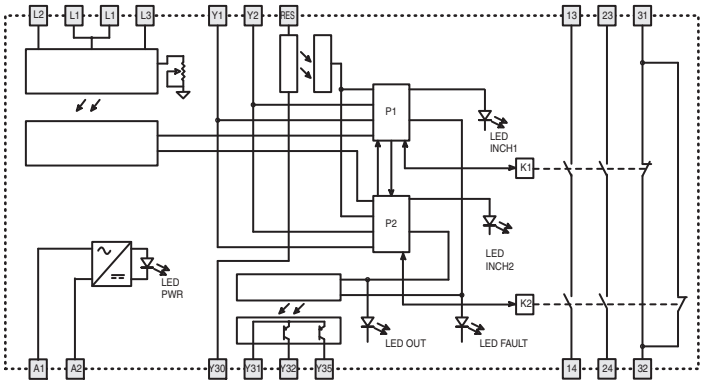


Reset (RES) operation



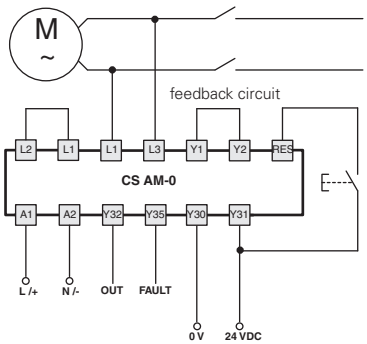
Legend:
- t_C: simultaneity time
- t_A: response time
- t_{R1}: release time
- t_R: release time in absence of power supply

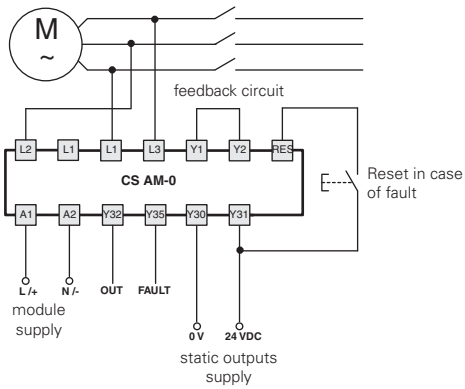
Internal block diagram



Input configuration

Single-phase motor	Three-phase motor





In case of star/delta starting, connect the module to the ends of a single winding

For dc motors connect + with L1 and - with L3.

For single-phase connections, connect the phase with L1 and the neutral with L3.

The diagram does not show the exact position of the terminals in the product

Application example on page 307.